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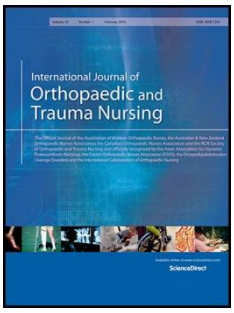

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Factors associated with the successful removal of indwelling urinary catheters post-operatively in the fragility hip fracture patient.

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Abstract

Introduction
Patients presenting to hospital with a fragility hip fracture are routinely catheterised in the emergency department. Studies have found that the duration of catheterisation is the greatest and most important risk factor for developing a urinary tract infection. Whilst there is a considerable body of evidence around correct techniques for insertion of urinary catheters, there appears little evidence as to the timing of their removal.

Aim of the study
To describe the current practice of IDC removal post operatively in the fragility hip fracture patient and to identify factors associated with the successful removal of IDCs post operatively in the same cohort of patients.
Methods
This study was a retrospective cohort analysis of patients admitted to a large, tertiary hospital with an established ortho-geriatric model of care.
Results
Aperient regime was the only factor that appeared to have a significant impact on the successful IDC removal. The patient commenced on the aperient regime was three times more likely to have an unsuccessful IDC removal than the patient on a limited or no aperient regime.
Conclusion
This study highlights the need for redesigning care that is patient focused, evidence-based, effective and efficient. The argument that a patient's bowel is required to be emptied prior to the successful removal of an IDC appears to be false, as in this study it was not identified as a predictor of successful IDC removal. A prospective clinical trial may be the next step forward in developing a clinical guideline for the successful removal of IDCs in the fragility hip fracture patient and/or surgical patient. Nurses have a crucial role to play in contributing to evidence based practice and are continually challenged to do so.

Introduction

Hip fracture is the term used to describe a proximal fracture of the femur (Wakeman, Currie, & Fleming, 2009). It has been estimated that more than forty Australians sustain a hip fracture daily; with most being aged sixty five years and older, and more than half aged eighty five and over (Australian Institute of Health and Welfare AIHW, 2010, p. 2). Hip fractures commonly occur in the frail and elderly (Sørbye & Grue, 2013) and are typically associated with osteoporosis (Elliot-Gibson, Bogoch, Jamal, & Beaton, 2004) with the clinical manifestation of the disease being fragility fracture (Mitchell & Adekunle, 2010). It has been shown that in the elderly patient a fragility hip fracture can cause significant changes in their health status, with urinary continence one of the many areas affected (Sørbye & Grue, 2013). It has been reported that over one hundred million urinary catheters are used annually worldwide (Nasr, 2010). An estimated 15% to 20% of all patients admitted to hospital are catheterized to monitor urine output (Singh & Schmidt, 1996), with the use of indwelling urinary catheters being amongst the most over-used devices in modern health care

(Gould, 2015). Patients presenting to hospital with a fragility hip fracture are routinely catheterized in the emergency department prior to surgery. Mears & Kates (2015) suggest this is to reduce skin inflammation and pain in female patients; and incontinence or voiding difficulties in males. However Wald, Epstein and Kramer (2005) suggest the rationale for this is to reduce post-operative bladder dysfunction caused by anaesthesia and analgesia. Urinary retention is defined as the inability to voluntarily void urine (Selius & Subedi, 2008). It is acknowledged that urinary retention can have a debilitating impact on both the patient's quality of life as well as causing increased cost within the health system (Yoon, V, & Woo, 2015). Urinary retention is a common problem following indwelling urinary catheter removal and is estimated to potentially occur from 7 to 48 hours post removal (Griffiths, Fernandez, & Murie, 2004). One study highlighted elderly patients being at a higher risk of developing drug induced urinary retention when certain existing co-morbidities and concomitant medications are used including anticholinergic medications and calcium channel blockers (Selius & Subedi, 2008). Another study reported the highest risk of urinary retention was found in men 60 years of age and over (Selius & Subedi, 2008). Baldini, Bagry, Aprikian and Carli (2009) report up to 70% of patients develop urinary retention post operatively and suggest that post-operative urinary retention is influenced by patient comorbidities, type of surgery and anaesthetic type.

There is a significant infection risk associated with catheterization which is (Getliffe, 2003) estimated to be about 5% per day for short-term catheter use. Studies have found that the duration of catheterization is the greatest and most important risk factor for developing a urinary tract infection (UTI) (Getliffe, 2003; Stamm, 1975). A large retrospective cohort study of 35, 904 patients at 2,965 acute care hospitals in the United States found that indwelling urinary catheters, that remained in situ greater than 48 hours post operatively, resulted in twice the number of UTIs when compared with patients whose urinary catheters

were removed within or less than 48 hours (Wald, Ma, Bratzler, & Kramer, 2008). Thus limiting the length of time a catheter remains insitu is an effective strategy to assist in the prevention of catheter acquired UTI (Nicolle, 2005).

Whilst there is a considerable body of evidence around correct techniques for insertion of urinary catheters, there appears little supporting evidence as to the timing of their removal, particularly in the fragility hip fracture patient. Irani (1995) speculates that policies for removing indwelling urinary catheters are often based on personal preference rather than them being based on the application of research and clinical evidence. A Cochrane review (2009) examining strategies for removing indwelling urinary catheters list 26 trials involving a total of 2,933 participants. Based on findings from 13 of the trials, limiting how long a catheter was left in place correlated with a shorter stay in hospital and reduced risk of infection. Gould (2015) adds that many hospitalized patients remain catheterised unnecessarily. The United States Centres for Disease Control and Prevention (2010) recommends the removal of a urinary catheter when the indication no longer exists. They also provided quality evidence showing that a shorter length of post-operative catheterization was of benefit across a range of outcomes.

In 2006 an ortho-geriatric model of care (OGMOC) was established at a major inner city teaching hospital in South East Queensland. The OGMOC may be defined as the provision of specialist medical care for older people with fragility hip fracture that is provided collaboratively by orthopaedic surgeons, geriatricians, allied health and aged care services (Cameron, 2005). It is regarded as the gold standard of care and recognised as one of six standards of care by the British Orthopaedic Association (British Orthopaedic Association, 2007).

The OGMOC was introduced to improve the management of patient's presenting to the hospital with fragility hip fracture. Significant improvements in patient outcomes and a substantial decrease in length of stay (LOS) from 21 days pre OGMOC in 2005, to 5.5 days seven years post the introduction of the OGMOC in 2013 were achieved.(Lynch, Shaban, & Massey, 2015). However a common cause impacting on LOS for post fragility hip fracture patients at this institution was the delay in successfully removing the IDC post fracture repair. Anecdotally there appeared to be an unwritten understanding in clinical practice at our institution that unless a recent bowel movement had occurred, the risk of unsuccessful IDC removal was high. Therefore the IDC commonly remained insitu awaiting a post-operative bowel movement, which could often take days. The primary aim of this study was to describe the current practice of IDC removal post operatively in the fragility hip fracture patient at our institution and secondly, to identify factors associated with the successful removal of IDCs post operatively in the same cohort of patients.

Methods

This study was a retrospective cohort analysis of patients admitted to a large, inner city and tertiary hospital with an established OGMOC for the management of fragility hip fracture patients. 209 patients admitted to the unit with a diagnosis of fragility hip fracture between June 2013 and May 2014 were identified from the internal electronic hip fracture database developed at the institution. One staff member was responsible for the security of the database, with access to the data by invitation only. Patient data was recorded in the database by either the Neck of Femur (NoF) nurse or a nurse researcher ensuring all data was captured and recorded. Patients were then screened for inclusion in the study. The criteria for patients to be included in this study were as follows:

- Deemed to be medical stable – was defined as 'a state of health or disease from which little if any immediate change is expected'(Anderson, 2009) .
- Had sustained a fragility hip fracture and were admitted and treated under the OGMOC.

Patients were excluded from the study if:

- The hip fracture had been sustained from high speed trauma, was deemed to be pathological in nature or if the patient had a pre-existing IDC insitu on admission.
- Patients who were not admitted to the OGMOC, patients receiving bladder cancer therapy and patients with bladder trauma were also excluded from the study.

110 patients met the inclusion criteria and underwent a full medical chart review to obtain the information for the data set. To ensure rigor and validity of the information transcribed and documented, random audits of patients charts included in the study was undertaken by another nurse researcher.

Current practice in the Orthopaedic Unit at the time of the study was to remove the IDC post operatively once the patient had a bowel movement, with this ideally occurred within 48 hours post operatively. To encourage early bowel movement whilst in hospital, the patient was started on a bowel management protocol (aperient regime) consisting of twice daily dosing of 2 x coloxyl and senna tablets with the addition of movicol as required. All other aperient regimes that consisted of less than this standard treatment were categorised as 'limited or no regime'. Bowel management protocols are a common practice in orthopaedic units due to the high rate of constipation post orthopaedic surgery (Naglie et al., 2002). For the purpose of this study the successful removal of an IDC was defined as complete bladder emptying with no or minimal urine residual post IDC removal. Unsuccessful removal of IDC

was defined by the patient requiring re-catheterisation due to incomplete bladder emptying with significant residual urine post IDC removal.

Demographic and medical data was collected and included: age, gender, mobility 24 hours post-operatively, date of surgery, date of IDC insertion and date of IDC removal, presence of urinary tract infection, anaesthetic type and American Society of Anaesthesiologists (ASA) grade. A list of post-operative aperients was recorded as was the number of days post-surgery till bowel movement.

To identify factors that may be associated with the removal of IDC's post operatively in the fragility hip fracture patient the following details were documented:

- If patient was on anticholinergic and or calcium channel blockers (CCB).

Ethical Considerations

Ethical approval to conduct the study was obtained from the Human Research Ethics Committee of the institution.

Data analysis

Data was analysed using the statistical package STATA13 (Statacorp, Texas). Descriptive statistics were calculated with the median and range reported for continuous variables and frequencies and proportions for the categorical variables. Univariate logistic regression modelling was used to calculate the association between successful removal of the IDC and predictors reporting the odds ratios (OR) and 95% confidence intervals (CIs) for each factor. The level of statistical significance was set at $p < 0.05$.

Results

A total of 209 patients were admitted to the orthopaedic unit with a fragility hip fracture between July 2013 and May 2014 inclusive. Of these, 99 patients did not meet the inclusion criteria and were therefore excluded from the analysis (Figure 1).

Women made up 80% of the study cohort with a mean age of 82 years and men a mean age of 81 years (Table 1).

There were no differences found between male and female participants, no differences in the demographic and or clinical characteristics of patients between the successful IDC removal and unsuccessful IDC removal groups (Table 1). Interestingly, the American Anaesthetics Association, ASA grade (Anesthesiologists, 1963) a system for assessing the fitness of patients before surgery, in this study did not have any impact on IDC removal. Anaesthetic type, spinal or general did not impact on IDC removal. Moreover mobility level at day 2 did not appear to have any impact on successful IDC removal (52% successful versus 53% unsuccessful p=0.92). The average time to removal of IDC in both the successful and unsuccessful groups was 2 days with the larger range of days of 1 – 8 days in the successful cohort.

The only factor that appeared to have a significant impact on successful IDC removal related to aperient regime. Only 42% of patients on an aperient regime had their IDC removed successfully compared to 71% of those patients not on any aperient regime (Table 2). The level of significance was set at $p < 0.05$.

Discussion

The purpose of this study was firstly to describe the current practice of IDC removal and secondly to identify factors that may be associated with the successful removal of IDC's in patients presenting to our institution with a fragility hip fracture. The practice of waiting for bowels to open prior to removing an IDC seems to be widespread within the clinical practice at our institution; however there appears to be a scarcity of supporting evidence for the practice. A retrospective chart audit of predictors of acute urinary retention undertaken at our institution in 2011 (McKinnon, Higgins, Lopez, & Chaboyer) reported on the supposition that constipation could lead to acute urinary retention which was not supported in their study. Moreover Selius and Subedi (2008) reported that significant faecal impaction if large enough may result in urinary retention due to extrinsic bladder neck compression. The fear of faecal impaction in the older patient may have contributed to the practice of waiting for bowels to open post operatively prior to IDC removal.

The only significant finding from this study was that the patient commenced on the aperient regime was three times more likely to have an unsuccessful IDC removal post hip fracture surgery than the patient on a limited or no aperient regime. This may reflect a poor bowel habit pre fracture and should be addressed on admission with an aggressive bowel regime in this cohort of patients. As discussed by Kates et al (2015) better attention to bowel regimes may reduce readmission following hip fracture surgery. There is controversy surrounding the length of catheterisation time and its relationship with successful IDC removal. Five studies reviewed by Yoon et al (2015) revealed no consistency regarding timing and success. It was however noted that having an indwelling urinary catheter for greater than 3 days was affiliated with increased complication such as infection (Yoon et al., 2015). The rate of

hospital acquired UTIs reported in our study were the same (12%) for both successful and unsuccessful IDC removals (p=0.99).

The study documented anticholinergic and/or calcium channel blocker usage in patients as both these classes of drugs are known to have a causal relationship with urinary retention (Selius & Subedi, 2008) and may therefore impede the successful removal of an IDC. However in our study 82% of patients who had an unsuccessful IDC removal were prescribed neither of these medications. A Cochrane review in 2009 (Rhonda & Fernandez) undertaken to review strategies for the removal of short-term indwelling urethral catheters in adults examined twenty six trials involving a total of 2933 participants and found little evidence relating to effective removal strategies. Moreover this suggests bowel status is not widely reported on when reviewing IDC removal strategies. There was suggestive, albeit inconclusive evidence of a benefit from midnight removal of the IDC's and a shorter hospital stay after early rather than delayed IDC removal.

Limitations

Our results should be evaluated in the context of the studies limitations. In particular our data was hand abstracted from medical records and transcribed from a database and whilst every precaution was taken to ensure robust transcription, the data is still subject to errors of transcription. A further limitation of the study was the relatively small sample size.

Conclusion

This study highlights the need for redesigning care that is patient focused, evidence-based, effective and efficient. The argument that a patient's bowel is required to be emptied prior to the successful removal of an IDC appears to be false, as in this study it was not identified as a predictor of successful IDC removal. A prospective clinical trial may be the next step forward

in developing a clinical guideline for the successful removal of IDCs in the fragility hip fracture patient and/or surgical patient. Nurses have a crucial role to play in contributing to evidence based practice and are continually challenged to do so.

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Ethics statement

This research received ethics approval from the Metro South Hospital and Health Service, Human research Ethics Committee number: HREC/10/QPAH/206

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Conflict of Interest Statement

There is no conflict of interest to declare

Abbreviations

LOS Length of Stay

OGMOC Ortho geriatric model of care

IDC Indwelling urinary catheter

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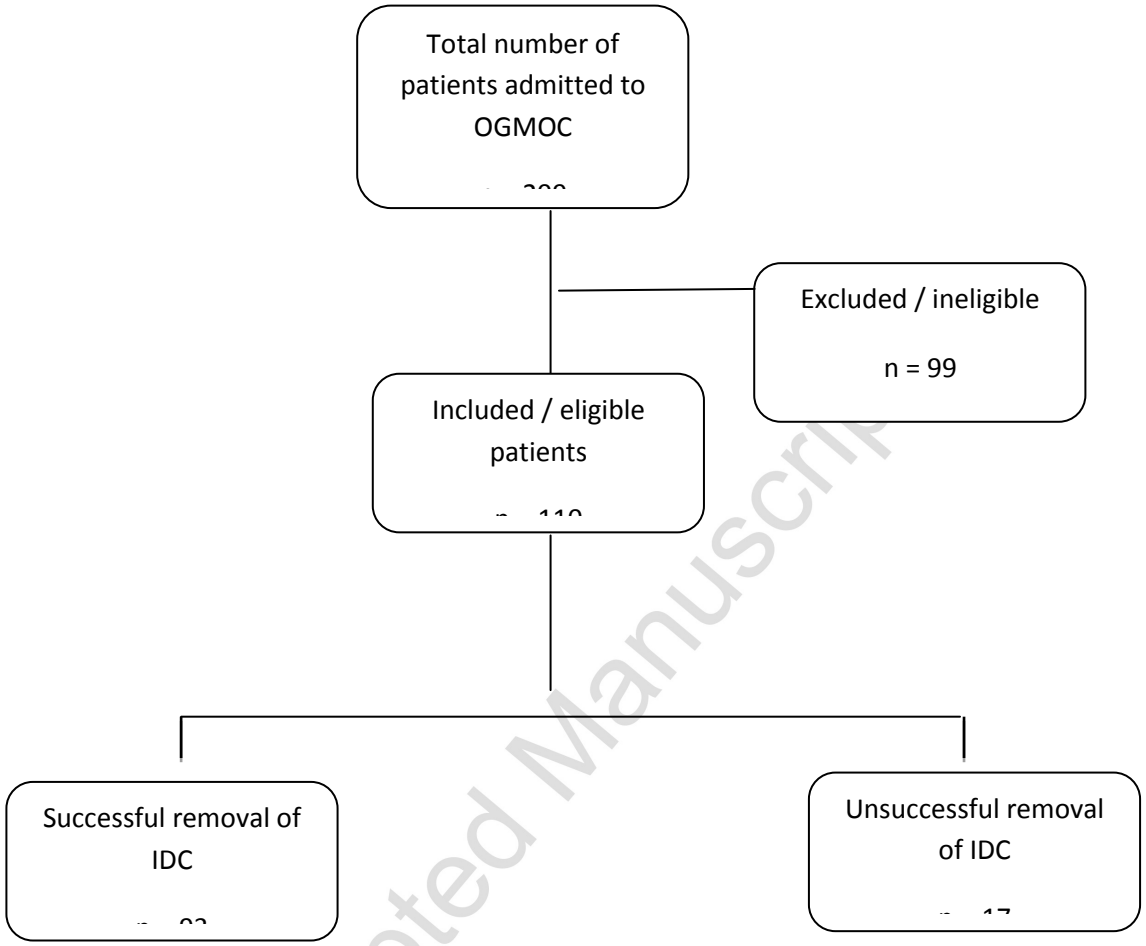

Figure1. Eligibility criteria

Table 1: Patient and treatment characteristics with univariate analyses (n =110)

	Successful removal IDC n = 93 (%)	**Failed removal IDC n = 17 (%)**	**P Value**	**Odds ratio for successful removal (95% CI)**
Age - years median(range)	83 (57 -98)	85 (72 – 91)	0.79	0.96 (0.90, 1.03)
Sex				
Male	16 (17)	6 (35)		1
Female	77 (83)	11 (65)		0.38 (0.12, 1.18)
Urinary Tract Infection				
On admission	22 (24)	3 (18)	0.59	1.45 (0.38, 5.50)
Hospital Acquired	11 (12)	2 (12)	0.99	1.01 (0.20, 5.00)
IDC inserted			0.47	
pre op	82 (88)	16 (94)		1
peri/post op	11 (12)	1 (6)		2.15 (0.26, 17.81)
ASA			0.96	
2	17 (18)	3 (18)		1
3	57 (61)	11 (65)		0.91 (0.23, 3.66)
4+	19 (20)	3 (18)		1.12 (0.20, 6.30)
Anaesthetic			0.15	
General	83 (89)	13 (76)		1
Other[a]	10 (11)	4 (24)		0.39 (0.11, 1.43)
Medications			0.42	
No medication	58 (62)	14 (82)		1
Anticholinergic	13 (14)	1 (6)		3.14 (0.38, 26.04)
CCB	18 (19)	2(12)		2.17 (0.45, 10.47)
CCB + Anticholinergic	4 (4)	0		-
Aperients			0.03	
Regime	39 (42)	12 (71)		1
Limited / no regime	54 (58)	5 (29)		0.30 (0.10, 0.92)
Mobility day 2			0.92	
≥5m	48 (52)	9 (53)		
≤5m	45 (48)	8 (47)		1.05 (0.37, 2.97)
Bowel movement -days post-op, median(range)	2 (0 – 6)	2 (1 – 5)	0.39	1.17 (0.75, 1.85)
Removal of IDC - days post-op, median(range)	2 (1-8)	2 (1 – 3)	0.26	1.37 (0.82, 2.27)
IDC insitu – total days, median (range)	3 (1 – 10)	3 (2 – 12)	0.95	0.91 (0.70 , 1.18)

a= Other anaesthetic include: General+ nerve block, spinal, general + spinal

Table 2: IDC removal

	Successful removal of IDC	Unsuccessful removal of IDC	P-value
Aperient regime	42%	71%	0.03
Limited regime /no	58%	29%	